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EXAMINER

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/771,060  
Filing Date: February 04, 2004  
Appellant(s): MINAMIHARA ET AL.

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Brandon B. Crisp  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 10/08/2008 appealing from the Office action mailed 03/10/2008.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

The withdrawal of the appeal as to claims 1 through 10 operates as an authorization to cancel these claims from the application or reexamination proceeding. See MPEP § 1215.02. Accordingly, these claims are canceled.

Claims 11-18 and 20 stand rejected. Claim 19 was previously cancelled by Appellants. Appellants appeal the rejection of claims 11-18 and 20

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,953,388	Shimagaki	11-2005
6,458,013	Saka	10-2002
6,663,787	You	12-2003
5,702,977	Jang	12-1997
2002/0098789	Burke	7-2002

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 11 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (US 2002/0098789) and further in view of Saka (US 6,458,013)

1. Regarding claim 11.
2. Shimagaki teaches a method of polishing a substrate. Said method comprises a pad for use in CMP (column 1 lines 5-15). The polishing process is used on insulating or metallic layers formed on a semiconductor wafer (column 19 lines 20-30). The

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process comprises. The polishing process uses a polishing slurry (column 13 lines 45-55). Polishing slurries are applied to the surface of the substrate. The pad comprises a resin matrix (column 5 lines 20-35). Further the pad comprises particles of soluble material that will elute out during the polishing process forming interstices in the surface of the pad (column 13 lines 40-60). The amount of soluble material is preferably between 0.5 and 5.0 wt% (column 14 lines 1-5). The material for the polishing pad matrix and the soluble particles have a density of approximately 1 g/cm<sup>3</sup> and will therefore result in a soluble particle volume component ranging from 0.5 to 5.0 % of the pad total volume. Shimigaki teaches that the polishing slurry may contain abrasive grains (column 13 lines 55-65).

3. In the embodiment Shimigaki does not teach that the polishing pad is placed on a turntable.
4. Shimigaki teaches putting the polishing pad on a turntable (column 19 lines 50-55)
5. It would have been obvious to one of ordinary skill in the art to put the polishing pad on a turn table so that it can be used to polish.
6. Shimigaki does not teach the size of the eluting particles.
7. Burke teaches a method of making a semiconductor device. Said method comprising a polishing pad being used to apply abrasive slurries to the substrate (paragraph 34). Said pad comprising a matrix (11) having cells (14) recessed into the matrix (11) dispersed across a surface region of the polishing pad (fig 3) (paragraph 36). Each cell is formed by the liberation of a particle from the matrix leaving a void with

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a size ranging from 5 to 250 microns (paragraph 51) thereby forming a surface having a microtexture of 1-5 microns (paragraph 35).

8. It would have been obvious to one of ordinary skill in the art to use particles of 5 to 250 microns in order to transfer sufficient slurry across the surface of the substrate.

3. Shimagaki in view of Burke does not teach the compression elastic modulus of the pad.

4. Saka teaches a polishing pad having a compression elastic modulus of between 300 and 600 Mpa (column 11 lines 55-60). Further, compression modulus is a property of the material used and does not depend on the location of the pad.

5. It would have been obvious to one of ordinary skill in the art to use an eluting polishing pad having a compression elastic modulus of 500 Mpa in order that it has sufficient strength to maintain its form during processing and reduce dishing but is not so hard as to risk scratching the substrate to be polished. Further, such pads are used in the art and would therefore be obvious to try.

9. Regarding claim 20.

10. Shimagaki teaches further that the pad comprises particles of water soluble material that will elute out during the polishing process forming interstices in the surface of the pad (column 13 lines 40-60).

11. Claims 12 through 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (PG Pub 2002/0098789 A1) in view of Saka (US 6,458,013) as applied to claim 11 and further in view of You (US 6,663,787 B1).

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12. Regarding claim 12.

13. Shimigaki in view of Burke in view Saka teaches elements of the claim invention above in the rejection of claim 11.

14. Shimagaki in view of Burke in view of Saka does not teach that the polishing pad may be used to polish a conductive layer formed over an insulating layer.

15. You teaches a method of making a semiconductor device using a copper damascene method. Said method comprising depositing a first insulating layer (142) forming a second insulating layer (113) over the first insulating layer (142) (fig 5d) (column 18 lines 15-45). Forming a recess (146) in the insulating layers (fig 5g) (column 19 lines 10-30). Depositing a conductive layer (122) over the insulating layers (fig 5k) (column 20 lines 20-40). Polishing the conductive layer to form a wiring layer (fig 5L) (column 20 lines 40-55).

16. It would have been obvious to use the polishing pad and process of Shimigaki in view of Burke in view Saka to polish the conductive layer of You in order to get a highly planar surface.

17. Regarding claim 13.

18. You further teaches the use of copper as the conductive layer to be polished (column 20 lines 20-40).

19. It would have been obvious to use copper as the conductive layer in order to get a highly conductive metallization.

20. Regarding claims 14, 15, and 16.

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21. You further teaches the use of silicon nitride as the second layer (column 18 lines 50-60) and polyaryl ether as the first layer (column 18 lines 5-10). Polyaryl ether has a dielectric constant of less than 2.5 and silicon nitride has a dielectric constant higher than polyaryl ether.

22. It would have been obvious to one of ordinary skill in the art to use silicon nitride over polyaryl ether in order to minimize the intermetal insulator dielectric constant and protect the low dielectric constant intermetal dielectric from polishing damage.

23. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (PG Pub 2002/0098789 A1) in view of Saka (US 6,458,013) as applied to claim 11 and further in view of Jang (US 5,702,977).

24. Shimagaki in view of Burke in view of Saka teaches elements of the claimed invention above in the rejection of claim 11

25. Shimagaki in view of Burke in view of Saka does not teach the use of the polishing to polish an insulator deposited in a trench.

26. Jang teaches a method of making a semiconductor device. Said method comprises providing a semiconductor substrate (30) (column 5 lines 45-55). Forming a trench (29) in the semiconductor (30) (fig 3) (column 5 lines 50-65). Depositing an insulating layer (42) over the trench (29) and substrate (30) (column 9 lines 45-55). Polishing the insulating layer to form a patterned buried insulating region (42b) (fig 8) (column 10 lines 30-45).

27. It would have been obvious to use the polishing pad and process of Burke to polish the insulating layer of Jang in order to get a highly planar surface.



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28. Regarding claim 18.

29. Jang teaches that the insulating layer (42) comprises silicon dioxide (column 9 lines 55-65).

30. It would have been obvious to one of ordinary skill in the art to use silicon dioxide for the insulating layer formed in the trench because it provides adequate isolation in an efficient process.

### **(10) Response to Argument**

The appellant argues that Shimagaki, Burke, You, and Jang do not separately or in combination teach a polishing pad having a modulus of elasticity of 300 to 600 MPa.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Shimagaki, Burke, You, and Jang are each relied upon for teaching elements of the claimed invention other than the modulus of elasticity of the polishing pad.

The appellant argues that Saka teaches that a composite pad wherein although the top layer comprises a material having a modulus of elasticity of 500 MPa, the composite pad as a whole does not (page 6).

In response to appellant's argument that Saka teaches a composite pad having a different modulus, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it

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that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Saka is not being relied upon to teach a composite pad, rather Saka is being relied upon to teach the material properties of a layer of pad material. Saka clearly teaches a pad material comprising a modulus of elasticity between 300 and 600MPa (Saka column 11 lines 55-60).

The appellant further argues that Saka teaches that the layer of pad material is on a sublayer and not a turntable (page 7).

First, that the layer is "on" does not necessarily connote that the layer is in contact.

Therefore the appellant is arguing features that are not in the claim. In response to appellant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., that the layer is in contact with the turntable) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Second, a sublayer disposed on a turntable, will turn thereby becoming the turning table for layers disposed thereon. This can be noted from the figures (1a-1c) shown in Saka which illustrate the composite pad moving as a unitary body rather than

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the separate layers of the pad moving independently or not at all. Third, disposing a polishing pad on a turntable of some sort is obviously necessary for the operation of the polishing pad (see Shimigaki 6,953,388 column 19 lines 50-55). As one of ordinary skill in the art would understand a polishing pad must move relative to the wafer in order for mechanical polishing to occur (see Saka figs 1a-1c).

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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